



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/820,691	03/30/2001	Duane Outka	015290-496	4165

21839 7590 09/30/2003

BURNS DOANE SWECKER & MATHIS L L P
POST OFFICE BOX 1404
ALEXANDRIA, VA 22313-1404

EXAMINER

OLSEN, ALLAN W

ART UNIT	PAPER NUMBER
----------	--------------

1763

DATE MAILED: 09/30/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/820,691	OUTKA ET AL.	
	Examiner	Art Unit	
	Allan W. Olsen	1763	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 30 March 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 30 March 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
 If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 a) ☐ All b) ☐ Some * c) ☐ None of:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
 * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
 a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- | | |
|---------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claims 3, 9 and 20 are objected to because of the following informalities:

Claim 3 - the formula " $C_xH_yF_z$ " should read -- $C_xF_yH_z$;

Claim 9 - The claimed chamber pressure range is from 5 to 1000 mTorr. The examiner does not understand why this claimed range is divided into three ranges.

Claim 20 - "The method od..." should read --The method of...--

Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 16 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 16 recites "...the cleaning gas includes O₂, Cl₂ and/or BCl₃." It is not clear if the cleaning must include O₂ with one or both of the chloride gases or if it may include only BCl₃.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Art Unit: 1763

Claims 11, 13, 14, and 20 are rejected under 35 U.S.C. 102(e) as being anticipated by U.S. Patent 6,383,942 issued to Narita et al. (hereinafter, Narita).

Narita teaches etching an aluminum containing stacked film layer (13) through a patterned photoresist layer to form a patterned conductor line from the aluminum-containing layer (column 12, lines 48-55). Narita teaches using a first etchant composition of CF₄/Cl₂/BCl₃ and a second etchant composition of Cl₂/BCl₃ (column 7, lines 4-38). Narita teaches etching with an inductively coupled plasma that is generated by supplying 500 W of RF energy to a coil antenna while 350 W of RF energy is provided to the substrate supporting, pedestal electrode (column 13, lines 5-6).

Claims 1, 2, and 8 are rejected under 35 U.S.C. 102(a) as being anticipated by U.S. Patent 6,168,153 issued to Kitsunai et al. (hereinafter, Kitsunai).

Kitsunai teaches cleaning aluminum fluoride deposits from the interior surface of a plasma reaction chamber. Kitsunai teaches the plasma chamber can be an ECR or ICP chamber. Kitsunai teaches using a cleaning gas comprising Cl₂ and BCl₃.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Art Unit: 1763

Claims 12, 15 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Narita.

The above noted teachings of Narita are herein relied upon. Additionally noted are the following two teachings of Narita. Narita teaches etching in a plasma chamber that includes a gas distribution plate (figure 5, column 4, lines 51-53). Narita teaches controlling the ratio of the Cl₂ and BCl₃ flow rates (column 2, lines 80-44).

Narita does not teach the presence of a uniformity ring around the periphery of the wafer. Narita does not teach removing the substrate from the plasma chamber and then cleaning the chamber with a plasma.

It would have been obvious to one skilled in the art to use a uniformity ring because a uniformity ring is a standard component of a plasma reaction chamber.

Narita does not teach that the etch process reduces buildup of aluminum fluoride upon surfaces within the plasma chamber. However, as the process of Narita is the same as that of the claimed invention, Narita's method and the claimed invention would inherently achieve the same results.

It would have been obvious to one skilled in the art to plasma clean the reaction chamber because operating within a clean reaction chamber is essential for successful fabrication of semiconductor devices and such practice is customary in the field. It would have been obvious to remove the workpiece from the chamber so as not to damage the semiconductor devices fabricated thereon.

Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Narita as applied to claim 15 above, in view of U.S. Patent 6,420,274 issued to Baker et al. (hereinafter, Baker).

Narita does not teach using a cleaning gas comprising O₂, Cl₂ and/or BCl₃.

Baker teaches using a cleaning gas comprising O₂ and Cl₂ (column 1, lines 46-47).

Art Unit: 1763

It would have been obvious to one skilled in the art to use the cleaning gas of Baker comprising O_2 and Cl_2 , because Baker teaches that such a cleaning gas composition is typical for the removal of polysilicon deposits and Narita teaches etching a layer of polysilicon. Therefore, Narita's process will generate polysilicon residues that will be effectively cleaned by the cleaning composition taught by Baker.

Claims 17 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Narita as applied to claim 15 above, in view of Kitsunai and further in view of U.S. Patent 6,313,048 issued to Hineman et al. (hereinafter, Hineman).

As Narita does not teach cleaning the chamber with a plasma, Narita does not teach a cleaning gas composition comprising Cl_2 and BCl_3 . Narita does not teach the use of CHF_3 as a component of the etchant during the main etching step.

Kitsunai teaches a plasma cleaning gas composition comprising Cl_2 and BCl_3 .

Hineman teaches etching with CHF_3

It would have been obvious to one skilled in the art to use clean the reaction chamber of Narita with a plasma comprising Cl_2 and BCl_3 because Kitsunai teaches that a cleaning gas comprising Cl_2 and BCl_3 is effective at removing the aluminum fluoride deposits that would be deposited within the reaction chamber of Narita.

It would have been obvious to one skilled in the art to use CHF_3 as a component of the etchant during the main etching step of Narita because Narita teaches the use of CF_4 and Hineman teaches that CF_4 and CHF_3 are functionally equivalent as etchants.

Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kitsunai as applied above to claim 1.

Kitsunai does not teach a plasma chamber pressure of between 5 and 1000 mTorr.

Art Unit: 1763

It would have been obvious to one skilled in the art to use a pressure of between 5 and 1000 mTorr because this range encompasses the typical operating pressure for the apparatus used by Kitsunai.

Claims 3-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kitsunai as applied to claim 1 above, in view of Narita.

Kitsunai does not teach cleaning a chamber following an etching process defined by using a first etchant composition of CF₄/Cl₂ /BCl₃ and a second etchant composition of Cl₂/BCl₃.

Narita teaches an etching process defined by using a first etchant composition of CF₄/Cl₂ /BCl₃ and a second etchant composition of Cl₂/BCl₃.

It would have been obvious to use the cleaning process of Kitsunai to clean the plasma chamber of Narita because Kitsunai teaches a process that removes aluminum fluoride deposits from a plasma chamber which are the type of deposits generated by the process of Narita.

Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kitsunai as applied to claim 1 above, in view of Baker.

Kitsunai does not teach condition the plasma chamber after cleaning the chamber.

Baker teaches the conditioning of a plasma chamber after the chamber has been cleaned.

It would have been obvious condition the plasma chamber of Kitsunai after it had been cleaned because Baker teaches that this allows one to obtain repeatable results from repetitive plasma processes.

Conclusion

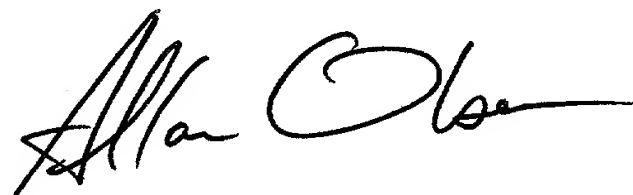
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Allan Olsen whose telephone number is 703-306-9075. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Greg Mills, can be reached on 703-308-1633.

Art Unit: 1763

The general fax numbers for TC1700 are 703-872-9310 (non-after finals) and 703-872-9311(after-final).

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 308-0661.

Allan Olsen, Ph.D.
September 24, 2003

A handwritten signature in black ink, appearing to read "Allan Olsen". The signature is fluid and cursive, with a long horizontal stroke extending to the right.